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July 7, 2016

VIA ELECTRONIC FILING

Ms. Marlene H. Dortch
Secretary
Federal Communications Commission
445 12th Street, SW
Washington, DC 20554

Re: Written *Ex Parte* Presentation

GN Docket No. 14-177, *Use of Spectrum Bands Above 24 GHz for Mobile Radio Services*

Dear Ms. Dortch:

In a recent *ex parte* letter,[1/] The Boeing Company ("Boeing") referred to a previous Straight Path submission almost one and a half years ago[2/] to support its argument that the Commission should reduce the permitted Effective Isotropic Radiation Power ("EIRP") level for millimeter wave base stations from 75 dBm per 100 MHz to 62 dBm per 100 MHz. Straight Path strongly opposes Boeing's last-minute proposal to limit the utilization of the 37/39 GHz band for 5G, with the goal of reserving the band for potential satellite use at an undetermined future date.

Boeing's Proposal Would Prevent the Introduction of 5G Terrestrial Services in the 37/39 GHz Band

Boeing requests that the Commission take the following actions:

- Reduce the 5G base station EIRP limit by 13 dB (from 75 dBm/100 MHz to 62 dBm/100 MHz)
- Increase the fixed satellite service ("FSS") power flux density ("PFD") limit by 12 dB (from -117 dBW/MHz/m^2 to -105 dBW/MHz/m^2)
- Remove the requirement that FSS ground stations obtain terrestrial licenses
- Allow unlimited FSS gateway stations and end-user terminals without exclusion zones

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1/ *See* Letter from Bruce A. Olcott, Counsel to The Boeing Company to Marlene H. Dortch, Secretary, FCC, GN Docket No. 14-177, *et al*. (filed July 5, 2016) ("Boeing July 5 Ex Parte Letter").

2/ *See id.* at 7-9 (citing Letter from Russell H. Fox and Angela Y. Kung on behalf of Straight Path Communications, Inc. to Marlene H. Dortch, Secretary, FCC, GN Docket No. 14-177, *et al.*, at Appendix A (filed Jan. 15, 2015).

Boeing claims FSS can "share" the 37/39 GHz band with 5G services under these terms. To the contrary, these conditions will effectively disable terrestrial 5G in the 37/39 GHz band. As the analyses from Straight Path,[3/] Nokia,[4/] Intel,[5/] and Samsung[6/] have shown, the 75 dBm per 100 MHz base station EIRP limit is crucial to achieving sufficient wide area coverage in a variety of 5G deployment scenarios. Reducing it to 62 dBm per 100 MHz will result in significant reduction of throughput and capacity. Similarly, increasing the FSS PFD limit by 12 dB would greatly increase the satellite interference at both the 5G base stations and mobile stations, resulting in significant reduction of cell coverage.[7/] The result of either of these two requests will multiply the cost of building the nation's 5G broadband infrastructure and effectively preclude the possibility of a nationwide 5G deployment in the 37/39 GHz band.

The Satellite Industry Has Failed to Use the Spectrum to Which it Already Has Access

The entire 37.5–42 GHz band (the "V-band") is already allocated for use by both FSS and terrestrial services.[8/] The "soft segmentation" regime the Commission adopted designates the 37.5–40 GHz portion of the V-band for terrestrial services and the 40–42 GHz portion for FSS. All of Boeing's proposed parameters are already available in the 40–42 GHz portion of the V-band. Yet the 40–42 GHz band has been lying fallow for the past 12 years. Moreover, the current rules in the 37.5–40 GHz portion of the V-band already allow use of the band by FSS under the following conditions:

- Use is restricted to FSS gateway earth stations;
- Terrestrial licenses are required for the gateway stations; and
- FSS PFD is limited to -117 dBW/MHz/m^2.

3/ *See* Letter from Davidi Jonas, CEO and President, Straight Path Communications, Inc., to Marlene H. Dortch, Secretary, FCC, GN Docket No. 14-177, *et al.* (filed June 20, 2016) ("Straight Path June 20 Letter"); s*ee also* Reply Comments of Straight Path Communications, Inc., GN Docket No. 14-177, *et al.*, at 26 ((filed Feb. 26, 2016) (noting that "[w]hile Straight Path initially suggested that 65 dBm EIRP could be practically achieved using the circuit technology today, we also recognize that the technology may be further improved and lead to higher achievable EIRP," and that "Straight Path suggests a middle ground of 72 dBm/100 MHz (and 75 dBm/100 MHz in rural areas) as the base station EIRP limit.").

4/ *See* Letter from Jeffrey A. Marks, Government Relations, Nokia to Marlene H. Dortch, Secretary, FCC, GN Docket No. 14-177, *et al.*, at Attachment 2, "5G Study: Simulation Results with different TX Powers & Bandwidths" (filed Feb. 18, 2016) ("Nokia Feb. 18 Ex Parte Letter").

5/ *See* Reply Comment of Intel Corporation, GN Docket No. 14-177, *et al.*, at 19 & Appendix A (filed Feb, 26, 2016) ("Intel Reply Comments").

6/ *See* Reply Comments of Samsung Electronics America, Inc. and Samsung Research America, GN Docket No. 14-177, *et al.*, at 13 (filed Feb. 26, 2016).

7/ *See, e.g.*, Comments of Straight Path Communications, Inc., GN Docket No. 14-177, *et al.*, at 33 (filed Jan. 27, 2016).

8/ *See Allocation and Designation of Spectrum for Fixed-Satellite Services in the 37.5-38.5 GHz, 40.5-41.5 GHz and 48.2-50.2 GHz Frequency Bands, et al.*, Second Report and Order, 18 FCC Rcd. 25428 (2003) ("*V-Band Second Report and Order*").

Straight Path Has Proposed a Plan for Real Sharing

In light of the requests from satellite industry, Straight Path has further proposed the following expansion of FSS rights to accommodate the potential future satellite use of the band:

- One FSS gateway station without the need to acquire a terrestrial license per licensed area, avoiding populated areas;
- Ample exclusion zone must be provisioned for such gateway stations; and
- FSS operators can acquire terrestrial licenses via auction or rights via secondary market if more gateway stations are needed.

Boeing has made no concrete proposal regarding sharing the 37/39 GHz band throughout the proceeding, but now asks the Commission to prioritize satellite use in the entire V-band – completely ignoring the public's need for spectrum to meet the explosive mobile broadband traffic growth while continuing to add to the multiple gigahertz of spectrum that has been allocated to FSS but that has been lying fallow for more than a decade (*e.g.*, the 40–42 GHz band, and the 47.2–50.2 GHz band).

The 75 dBm/100 MHz Base Station EIRP Limit Represents a Mobile Industry Consensus and is Supported by Recent Developments

Boeing's claim that Straight Path has provided the bulk of the analysis for the 37/39 GHz band is untrue.[9/] Many mobile industry participants, including Nokia,[10/] Intel,[11/] AT&T,[12/] T-Mobile[13/] have submitted multiple filings and provided detailed analyses of 5G systems and sharing issue with FSS in the 37/39 GHz band. The request that the Commission allow base station operations at 75 dBm per 100 MHz is also a consensus from the mobile industry,[14/] and it is crucial to enable 5G in the 37/39 GHz band.

[9/] *See* Boeing July 5 Ex Parte Letter at 6-7.

[10/] *See* Comments of Nokia, GN Docket No. 14-177, *et al.*, at Appendix A (filed Jan. 27, 2016); *see also* Nokia Feb. 18 Ex Parte Letter; Reply Comments of Nokia, GN Docket No. 14-177, *et al.*, at Appendix (filed Feb. 26, 2016).

[11/] *See* Intel Reply Comments at 8.

[12/] *See* Letter from Jennifer Manner and Stacey Black to Marlene H. Dortch, Secretary, FCC, GN Docket No. 14-177, *et al*. (filed Apr. 6, 2016); *see also* Letter from Joan Marsh, Vice President, Federal Regulatory, AT&T Services, Inc. to Marlene H. Dortch, Secretary, FCC, GN Docket No. 14-177 (filed July 7, 2016).

[13/] *See* Letter from Steve B. Sharkey, Vice President, Government Affairs Technology and Engineering Policy, T-Mobile US, Inc. to Marlene H. Dortch, Secretary, FCC, GN Docket No. 14-177, at Attachment (filed May 9, 2016).

[14/] *See, e.g.*, Letter from Joint Filers (Verizon, Samsung, Qualcomm, Nokia, Ericsson, and Intel) to Marlene H. Dortch, Secretary, FCC, GN Docket No. 14-177 (filed Apr. 21, 2016) (acknowledging that while many parties have advocated for even higher power levels, "the consensus of this group is that 75 dBm is a reasonable compromise.") ("Joint Proposal"); Letter from Joint Filers (AT&T, Ericsson, Nokia, Samsung, T-Mobile, and Verizon) to Marlene H. Dortch, Secretary, FCC, GN Docket No. 14-177 (filed

During the course of this proceeding, the global mobile industry has rapidly increased research and development activities for 5G. One of the important milestones is the 3GPP Technical Report on channel models above 6 GHz.[15/] In this Technical Report, 3GPP developed a comprehensive set of channel models for frequencies from 6 GHz to 100 GHz based upon multiple millimeter wave channel measurement campaigns conducted across the globe. These channel models provide a more informed understanding of the millimeter wave propagation characteristics. The 3GPP member companies further conducted system simulations based on these channel models. Based on those efforts, it now appears that Straight Path's early link budget estimate for wide area coverage is short by 7 dB. That estimate should be revised for wide area coverage from 160 dB to 167 dB. Note this link budget value is derived based on system simulation data provided by a group of 17 companies and institutions in 3GPP.[16/]

Our link budget analysis was also updated to reflect the latest agreement in the industry and in this proceeding. For example, the channel size is expected to be 200 megahertz in the 39 GHz band. The number of receiver antennas was revised from 16 to 8 to reflect the number of antenna elements we expect for a mid-range 5G smartphone. The noise figure was increased from 5 dB to 7 dB to reflect the ongoing discussion in 3GPP on this issue.[17/] Altogether, these developments lead to an updated link budget analysis that calls for a base station EIRP power limit of 75 dBm per 100 MHz. The 75 dBm per 100 MHz limit is still 10 dB below the EIRP limit currently allowed in the 39 GHz band for fixed services, including fixed point-to-multi-point services.[18/]

Satellite is Not, and Will Not Be a Significant Provider of Rural Broadband Service

Boeing and SIA have made multiple attempts to promote satellite broadband as a way to provide broadband access to all Americans, especially for rural areas. However, satellite broadband is not, and will not, be a significant provider of broadband access to the American public, including rural population. A survey from the NTCA – The Rural Broadband Association found that among the "more than 128 rural telecom and cable companies" that were surveyed by the NTCA,

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June 1, 2016); *see also* Letter from Dileep Srihari, Director, Legislative and Government Affairs, Telecommunications Industry Association to Marlene H. Dortch, Secretary, FCC, GN Docket No. 14-177, *et al*., Attachment at 3 (filed June 15, 2016) (supporting Joint Proposal to increase base station power limits from 62 to 75 dBm per 100 MHz EIRP).

[15/] *See* 3GPP TR 38.900 V1.0.0, "Channel model for frequency spectrum above 6 GHz," *available at* http://www.3gpp.org/ftp//Specs/archive/38_series/38.900/38900-100.zip ("3GPP Technical Report").

[16/] *See* 3GPP R1-164802, "E-mail discussion summary of the large scale calibration," *available at* http://www.3gpp.org/ftp/Meetings_3GPP_SYNC/RAN1/Docs/R1-164802.zip.

[17/] *See* 3GPP R1-165742, "WF on UE Receiver Noise Figures", *available at* http://www.3gpp.org/ftp/tsg_ran/WG1_RL1/TSGR1_85/Docs/R1-165742.zip. The 3GPP discussion on this issue is still ongoing. In fact, the current agreement on noise figure assumption in 3GPP is 13 dB for baseline receivers and 10 dB for high-performance receivers, 6 dB and 3 dB worse than the current noise figure assumption used in Straight Path link budget analysis. The required EIRP would be even higher if the current 3GPP agreement on noise figure assumptions is used.

[18/] *See* 47 C.F.R. Part 101.

"satellite was cited by less than a fraction of 1 percent of respondents"[19/] as the technology for broadband services. Similarly, the OECD Broadband Portal provides data shows that satellite accounts for a mere 0.8% of the fixed broadband connections in OECD countries.[20/]

In comparison, there are 355 million mobile broadband subscriptions in the United States.[21/] In other words, compared with satellite broadband, mobile broadband is a much more effective technology in providing broadband access to all Americans, including populations in rural areas. The success of mobile communication in the past two decades makes it clear that the future of broadband is mobile. In a fact sheet published in 2015, ITU found that "the global average price of a basic fixed-broadband plan (52 [Purchasing Power Parity] $) is 1.7 times higher than the average price of a comparable mobile-broadband plan (30 [Purchasing Power Parity] $)"[22/] Mobile broadband is a much faster and more cost-effective way to provide broadband to all Americans than satellite broadband.

5G Needs At Least One Band Not Encumbered By Satellite

As Boeing concedes in its own analysis, it has now become abundantly clear that the desired use of the band by 5G, *i.e.* – with 75 dBm per 100 MHz base station EIRP limit, no restriction on 5G base station antenna pattern and orientation, etc. – will not permit the desired use of the band by Boeing, *i.e.*, -105 dBW/MHz/m^2 FSS PFD limit, unlimited FSS ground stations. This is exactly what Straight Path has been advocating and serves as the foundation of Straight Path's compromise proposal. It would be unrealistic to expect both 5G and FSS to fully utilize the entire V-band in a way desired by both.

Our proposal is simple. Instead of tying the hands of both industries, the rules should favor use of the 37.5–40 GHz portion of the V-band for mobile operations, while the rules should favor satellite industry use of the 40–42 GHz portion of the V-band. Under this proposal, sharing of the entire V-band can still be achieved by allowing limited use of the 37.5–40 GHz portion of the V-band by the satellite industry, and limited use of the 40–42 GHz portion of the V-band by the mobile industry. To that end, we support T-Mobile's proposal to add the 40–42 GHz band for consideration in the FNPRM.[23/]

[19/] *See* Jeff Moore, "NTCA: More rural broadband customers are receiving FTTH than other broadband technologies," FierceInstaller (June 23, 2015) *available at* http://www.fierceinstaller.com/story/ntca-more-rural-broadband-customers-are-receiving-ftth-other-broadband-tech/2015-06-23.

[20/] *See* "OECD Broadband Portal," Organisation for Economic Co-Operation & Development (last updated Feb. 2016), *available at* www.oecd.org/sti/broadband/oecdbroadbandportal.htm.

[21/] *See id.*

[22/] *See* "ICT Facts & Figures", International Telecommunication Union (May 2015), *available at* http://www.itu.int/en/ITU-D/Statistics/Documents/facts/ICTFactsFigures2015.pdf.

[23/] *See* Letter from Steve B. Sharkey, Vice President, Government Affairs Technology and Engineering Policy, T-Mobile US, Inc. to Marlene H. Dortch, Secretary, FCC, GN Docket No. 14-177, at 3 (filed June 30, 2016); *see also* Letter from John Hunter, Senior Director, Technology and Engineering Policy, T-Mobile US, Inc. to Marlene H. Dortch, Secretary, FCC, GN Docket No. 14-177, at 2 (filed July 7, 2016).

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What's at stake in this proceeding is the future of the nation's next generation mobile broadband, and all the opportunities for social and economic prosperity that are contingent upon it. Boeing's proposal would allow FSS to enjoy the primary designation in the 40–42 GHz portion of the V-band, and effectively expand that same primary designation for FSS into the 37.5–40 GHz portion of the V-band, in complete disregard of spectrum needs of terrestrial services, and jeopardize the Commission's 5G vision and the nation's next generation mobile broadband in its entirety. Straight Path strongly urges the Commission to focus on the main goals of this proceeding and make the right technical rules to allow 5G services to best serve the American public interest.

Straight Path looks forward to working with all interested stakeholders to produce a timely resolution of this proceeding. Should there be any questions, the Commission is asked to contact the undersigned directly. Pursuant to Section 1.1206(b)(2) of the Commission's rules, a copy of this letter has been submitted in the record of the above-referenced proceeding.

Respectfully submitted,

/s/ Davidi Jonas

Davidi Jonas
CEO and President
Straight Path Communications, Inc.